VEHICLE PANEL WITH REINFORCEMENT LAYER

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates in general to a vehicle panel structure, and in particular to a vehicle panel structure that includes a core layer and a reinforcement layer made of a polypropylene/fiberglass material to provide dimensional stability to the vehicle panel structure while reducing the thickness and weight of the vehicle panel structure.

Description of the Related Art

[0002] A vehicle panel, such as a headliner, is designed to meet or exceed requirements for dimensional stability when exposed to temperatures of 160° C over a 24-hour time period. To achieve the requirements for dimensional stability, one or more reinforcement layers are included in the design of a conventional vehicle panel, such as a headliner. Unfortunately, one problem associated with conventional vehicle panels with one or more reinforcement layers to achieve the necessary dimensional stability requirements is that the reinforcement layers is bulky and unnecessarily increases the thickness and weight associated with the vehicle panel.

SUMMARY OF THE INVENTION

[0003] The inventor of the present invention has recognized these and other problems associated with conventional vehicle panels, and have developed a vehicle panel comprising a core layer and a reinforcement layer comprised of intermingled strands of fiberglass material and a polymer material having a linear density in a range between about 50 and 200 g/m^2.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] In the drawings:

[0005] Figure 1 shows a cross-sectional view of a vehicle panel structure including a core layer with a reinforcement layer according to an embodiment of the invention.

[0006] Figure 2 shows an enlarged view of the reinforcement layer according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0007] Referring now to Figure 1, a vehicle panel 10 is shown according to an embodiment of the invention. The vehicle panel 10 includes a core layer 12 and a reinforcement layer 14 positioned adjacent the core layer 12. Although the illustrated embodiment shows two reinforcement layers 14 positioned on opposite sides of the core layer 12, the invention can be practiced with a single reinforcement layer 14 positioned adjacent one side of the core layer 12.

[0008] The core layer 12 may be made of any desirable material. Preferably, the core layer 12 is comprised of any suitable material having insulating properties. For example, the core layer 12 may comprise a foam material, such as polypropylene or the like, and have a density and thickness that may vary depending on the design requirements. However, it will be appreciated that the core layer 12 can comprise any suitable material, such as polyethylene terepthalate (PET) or the like, depending on the design requirements.

[0009] The vehicle panel 10 may also include an adhesive layer 16, such as a 2-part adhesive film known in the art, applied between the reinforcement layer 14 and a cover material 20. The cover material 20 provides an aesthetically pleasing appearance, typically known as the "A" surface, to the vehicle panel 10. The cover material 20 may be comprised of any desirable material known in the art that provides an aesthetically pleasing appearance to the vehicle panel 10.

[0010] A scrim material 18 may be applied to the opposite side of the core layer 12 from the cover material 20. The scrim material 18 may be comprised of any desirable material known in the art. In the illustrated embodiment, the reinforcement layer 14 is disposed between the core layer 12 and the scrim material 18. However, it will be appreciated that the invention is not limited by the reinforcement layer 14 and

scrim material 18, and that the invention can be practiced without the reinforcement layer 14 and scrim material 18 being applied to one side of the core layer 12. In addition, it should be noted that in the illustrated embodiment, the reinforcement layer 14 is not attached to either side of the core layer 12, and is capable of easily being separated from the core layer 12 if necessary.

[0011] One aspect of the invention is that the reinforcement layer 14 provides dimensional stability to the vehicle panel 10, while decreasing the overall weight and thickness of the vehicle panel 10, as compared to conventional vehicle panels. For example, the reinforcement layer 14 has a linear density in a range between about 50 and 200 g/m^2, as compared to typical reinforcement layers that may have a linear density of at least 400 g/m^2. To accomplish this aspect of the invention, the reinforcement layer 14 of the invention comprises strands of fiberglass material 22 intermingled with a polymer material 24 to form a blended composition, as shown in Figure 2. In one embodiment of the invention, the fiberglass material 22 comprises approximately 20% to 80% by weight of the reinforcement layer 14.

[0012] Preferably, the polymer material used for the reinforcement layer 14 is compatible with the material used for the core layer 12 such that the reinforcement layer 14 can form a bond with the core layer 12. The polymer material 24 is preferably a high temperature polymer such that, upon an application of heat at a suitably low temperature, the adhesive layer 16 melts and adheres to the layers 14, 16 and 20 to each other, but not at a high enough temperature to melt the reinforcement layer 14, thereby allowing the reinforcement layer 14 to be easily separated from the core layer 12. One suitable high temperature polymer material 24 compatible with the material for the cover layer 12 is polypropylene, or the like. However, a low temperature polymer material may be included in the reinforcement layer 14 to act as a binder material to bond the reinforcement layer 14 to the core layer 12, if necessary.

[0013] One application of the vehicle panel 10 of the invention is a headliner for a vehicle. A headliner is designed to meet or exceed requirements for dimensional stability when exposed to temperatures of 160° C over a 24-hour time period. It has been found that when the core layer 12 with reinforcement layer 14 exhibits dimensional stability when exposed to a temperature of 160° C over a 24-hour time

period, as compared to conventional headliners that are designed with a heavier, thicker reinforcement layer. Thus, the vehicle panel 10 comprising the core layer 12 with reinforcement layer 14 can provide the same or better dimensional stability as a conventional headliner, while decreasing the weight and thickness of the conventional headliner.

[0014] While the invention has been specifically described in connection with certain specific embodiments thereof, it is to be understood that this is by way of illustration and not of limitation, and the scope of the appended claims should be construed as broadly as the prior art will permit.